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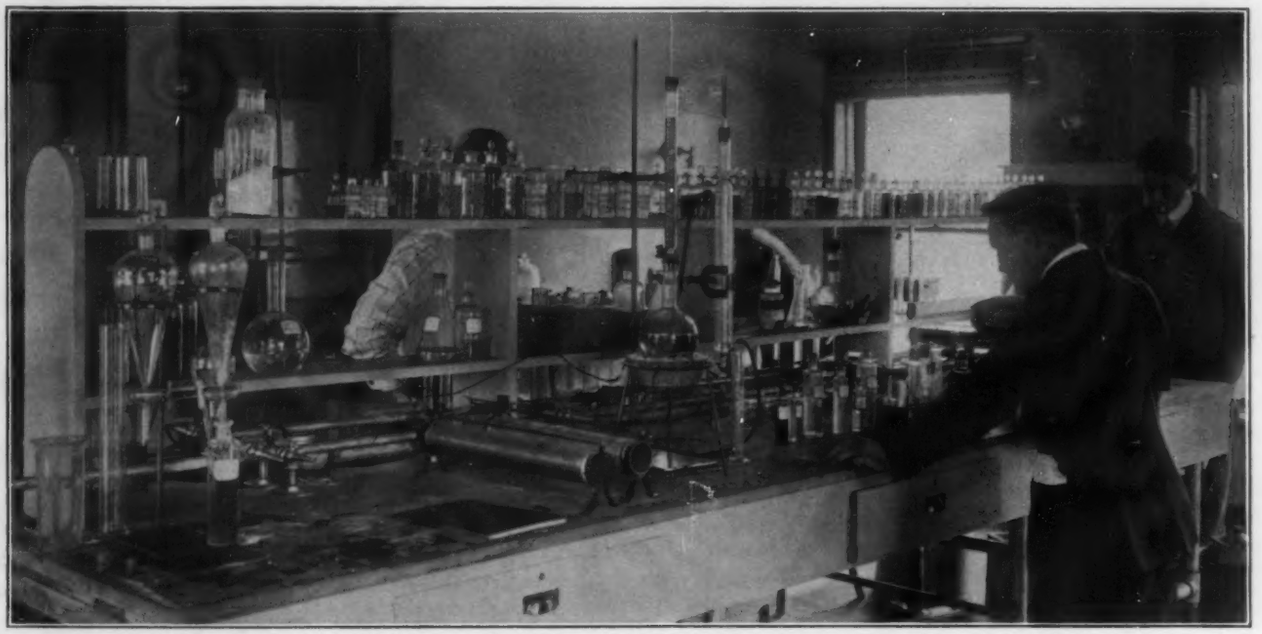
COMMERCIAL SUCCESS OF RITTMAN PROCESS

The Rittman process for the manufacture of gasoline, benzine and tuolene from crude oil has been proven a success on a commercially operative scale and a number of plants are being erected to supply the increasing demand for gasoline in automobiles and tuolene in the manufacture of explosives. The patents on both processes are to be dedicated to the public, and permits for their use may be obtained from the Secretary of the Interior. The full procedure for such application, as well as an account of all experiments, is given in Bulletin 114, from the U. S. Bureau of Mines.

The general method of operation in both processes is a repeated cracking of the oils. The conditions of control, however, differ materially, and the end products vary widely. The gasoline process is operated at lower temperatures and high pressures; for example, at a temperature of 500 deg. to 550 deg. C., and at a pressure up to 300 pounds, whereas the benzene-toluene process is operated at a temperature of 625 deg. to 675 deg. C. and at a pressure up to 250 pounds. The processes are to be distinguished from the ordinary cracking processes in that the hydrocarbon material is kept in a gaseous state throughout the entire course of operation.

Large yields of gasoline hydrocarbons from all petroleums from the lighest distillates to the heaviest residuum, including heavy crude oils of an asphaltic nature, such as crude Mexican and California oils.



Laboratory at Development Plant, showing Type of Distillation Apparatus and Electric Furnaces Used in Testing Cracked Oil.

On February 1, 1916, seven refineries, in six states, were installing plants for the gasoline process. The production from a given quantity of original oil is not limited to the first run, but the residuum above the gasoline fraction can be rerun through the furnace and a like proportion of cracked gasoline obtained. The process may be repeated until the oil has been completely converted In this manner 80 to 90 per cent of the original oil can be converted into gasoline. The favorable conditions for gasoline formation seem to be moderate temperatures and high pressures. In

commercial work, a temperature ranging between 500 deg. and 550 deg. C. and a pressure of 12 atmospheres and upward will be found suitable, as high a pressure as can be maintained within the limits of safety being desirable, because of the improved quality of the gasoline.

The so-called aromatic hydrocarbons can likewise be obtained in commercial quantities from all types of petroleum oils. The favorable conditions seem to be high temperatures and moderate pressures. In commercial work a temperature ranging between 625 deg. and 700 deg. C. and a pressure of upward of 8 atmospheres will generally be most suitable.

The war in Europe has created an enormous demand for benzene and toluene as raw materials for

Carbon Pots Used in Practical Treatment.

the manufacture of explosives. Toluene, which normally sells for less than 25 cents a gallon, can not be bought in quantity at present (November, 1915), at $5 a gallon.

Trinitrotoluene, which is obtained by treating these compounds with nitric acid, has taken first rank among the explosives used for bursting charges because of its low melting point, its safety in handling, its nonacidity, which eliminates corrosion of metallic surfaces in contact with it, and the ease with which the time of its explosion may be controlled.

The processes have been carefully studied with reference to their adaptability for treatment of California crude oils with an asphaltum base. Either is feasible and desirable. One of the greatest difficulties experienced in practice is accurate heat control. Most of the furnaces are gas-fired and do not lend themselves as readily to temperature regulation as do the electric furnaces employed in the laboratory experiments. This suggests the possibility of utilizing electric heat in the industrial treatment of the oils.

In many respects the Rittman process is one of the most useful inventions of the past decade. It opens up great possibilities for industrial development, not only in the supply of gasoline for automobiles and other uses, and of tuolene for explosives, but also of raw materials for the manufacture of aniline dyes.

DEPRECIATION AS AN ELEMENT IN RATE MAKING.

BY JARED HOW.

(This argument against the consideration of accrued theoretical depreciation in the cost to reproduce a utility is taken from a brief presented by the author before the California Railroad Commission in a rate case of the Northern California Power Company.—The Editor.)

All expenses incurred by the owner of a public service property, whether for operation of the property or maintenance of it, stand upon the same footing. They are all incurred in the performance of its obligations to the public arising under its franchise, of which the obligation to operate the property is no more nor less firm than the obligation to keep it in adequate condition for operation. And all such expenses are incurred because of the consumption, by the owner of the property, of some thing or other in producing the service to the public. It may take twenty minutes to consume a barrel of oil, used for fuel, and it may take twenty years to consume a steel rail in a railroad track. But whatever the period of time required for the consumption, and whatever the method through which the consumption progresses, the result is the same; and whatever is consumed must be replaced by the owner of the property by virtue of its obligation to the public—the steel rail to the end that the property may be maintained in adequate condition for operation; and the barrel of oil to the end that, when so maintained, the property may be continuously operated; and each of them and both of them to the end that the public may be assured of the sufficient and continuous service contemplated by the grant of the franchise under which it is rendered.

But barrels of oil are consumed rapidly and must be constantly replaced; while steel rails, and other things used by public servitors, such as pipes, machinery and so forth, are consumed slowly and are required to be replaced only at long intervals. If they could be replaced proportionately, from month to month, or from year to year, the expense of replacement in each month or in each year would be comparatively trifling; and, if collected as needed, would not be a serious burden upon the public which has to endure it. If, on the other hand, the collection by the owner of the property from the public of the amount necessary for replacement of articles which require replacement only at long intervals should be deferred until the year in which replacement should become necessary, the result would be such a great inequality in rates as would impose a serious burden upon the public. Therefore, in order that rates may be equable from year to year, it has become recognized as proper practice to permit the amount necessary for making such replacements to be collected by the public servitor from the public (if it can be done through rates which shall not be unreasonably high) in the same manner as if the replacements could and should be made proportionately from month to month, or from year to year, and to preserve the amounts so collected in what is commonly called a depreciation fund to respond for the expenses of replacement when it shall become necessary to incur them.

The amounts necessary for a proper depreciation

fund are measured by what is sometimes called accrued theoretical depreciation—that is to say, theoretical depreciation estimated for the period which the fund is designed to cover, and based on the diminution in the length of the original period of serviceability of the various items to which it is applied.

It is perfectly obvious that the so-called theoretical depreciation is not depreciation at all; and that it is merely progress toward the necessity for expenditures for maintenance. It has nothing to do with deterioration of the composite plant, considered as one entire instrument for the performance of the obligation to render the service to the public which its owner has assumed.

It is equally plain that the so-called depreciation fund is not a depreciation fund at all; and that it is merely a maintenance fund—a fund accumulated for use in the future to provide for the expense of the owner of the property, which must be incurred, in performing its obligation to maintain the property, at all times, in condition such that it will sufficiently render the service for which it was installed. So long as that obligation is performed, the property employed in the service never deteriorates in efficiency and, therefore, never depreciates in value for the only use by which its value may be estimated, because the only use to which it may ever be put—the service to the public for which it was enlisted under the franchise which covers it. And it seems to follow decisively that, so long as that obligation is performed, the value of the use of the property, as between its owner and the public which it serves, never can depreciate.

It is perfectly clear, further, that, inasmuch as this so-called depreciation fund has been collected from the public by the public servitor for the purpose of providing it with money to meet the expense of replacements when, from time to time, they shall become necessary for the maintenance of the property, the fund can be used only for that purpose. (Louisiana Railroad Com. vs. Cumberland Tel. Co., 212 U. S., at pages 424-5.) It is a quasi trust fund for the performance of the obligation of the public servitor to the public to keep the property devoted to the use of the public always in a condition of complete efficiency. If it were in fact a depreciation fund, instead of a maintenance fund, its function, of course, would be to compensate the owner of the property for the loss which it has sustained in the depreciation of the value of its property necessarily involved in rendering the service to the public—to amortize the investment so far as that depreciation in value has progressed. If that were its function, the amount in the fund would, as collected, be distributable to the stockholders of the owner of the property to indemnify them for loss in their investment. The fact—and no body will contend that it is not a fact—that the so-called depreciation fund may not properly be so distributed, but that it must be used, and used only, for replacement of such portions of the property as shall have been consumed in the service, is a complete demonstration to the conclusion that the fund is not a depreciation fund at all and that it is merely a fund provided for the payment of the expenses of operating the property.

The proposition that the obligation of the owner of the property grows toward maturity in precisely equal proportion with the progress toward destruction of the respective parts of the property to which the obligation attaches, seems to be mathematically exact; and, if accrued depreciation, at any time, of any such integral part can properly be said to exist and to be measured by the proportionate amount at that time of its progress toward destruction, it seems to follow, with mathematical exactness, that the accrued obligation of the owner to replace such integral part, when it shall have reached the end of its progress toward destruction, must also exist at the same time and must be measured by the same standard. If, then, the amount of "accrued depreciation" and the amount of "depreciated reproduction cost" of any privately owned public service property, make, together, the amount of the "cost to reproduce" the property, the conclusion is not to be avoided that the amount of accrued obligation to replace of the owner of the property and the depreciated reproduction cost of the property make together the cost to reproduce the property.

The fair value of the property at the time of its use must mean its fair value in the service rendered by its owner and not the fair value for the purpose of taking it out of that service; and, in view of what has been said with regard to the franchise obligation which attends privately owned public service property, it must mean the fair value of the property with the franchise obligation which covers it, and not its fair value stripped of that obligation. It must mean, therefore, the fair value of the property with its attribute of eternal life, and not its fair value without that attribute, but subject to the ordinary tendency to destruction.

Theoretical depreciation is based, not upon actual deterioration of the property to which it is applied, but upon its liability to deteriorate; and it is measured by the progress toward the end of serviceability of integral parts of the composite property, avowedly upon the theory that, when the end of that serviceability is reached, the value of the composite property will, on that account, be lessened. But, as has been demonstrated, that theory is utterly unsupportable; because, through intervention of the franchise obligation of its owner to maintain the property at all times in a condition of entire adequacy, the integral parts of the composite property which are subject to destruction must be replaced before they reach the end of their serviceability, and before their lack of serviceability may impair the value of the composite property. Considered merely as integral parts of the composite property—and that is their only function—they may never perish. They must always live—and live with full vigor. Theoretical depreciation, therefore, is based upon a tendency to destruction, and is measured by a growth toward destruction, neither of which has any existence.

The conclusion is not to be escaped, then, that lessening the fair value of privately owned public service properties by the amount of accrued theoretical depreciation, for the determination of the "basis of calculation" of the just compensation to the owner for the service rendered to the public, results in confiscation from the owner of just that amount of "the value of that which it employs for the public convenience." Minnesota Rate Case, 230 U. S. at page 435.

KEEPING ELECTRIC WATER HEATING "OFF THE PEAK."

BY T. W. SIMPSON.

(In view of the increasing importance of the electric range load to Western central stations this simple suggestion for the control of electric water heating should be of interest to central station operators. The author is manager of the Federal Sign System (Electric) at San Francisco.—The Editor.)

To justify low rates for electric water heating, many systems should keep this load off the peak insofar as possible. The problem is occupying the attention of some of the ablest utility operators at this time, and the following notes may not be amiss.

Which Peak to Keep Away From.

The capital investment for a wide extension of electric cooking and water heating is first noticed in the local distribution network, leading to the purchase of additional transformer and low voltage line capacity. These lines are those that supply households and they are loaded up to their peak in the evening lighting period regardless of whether or not the system or generating station peak is in this lighting period. The diversity factor on large generating systems may cause a day-time system peak or an "early evening peak" characteristic of large cities, but these system peaks are not coincident with the lighting peaks of the local distributing centers.

It is difficult to connect system peaks of this nature with the water heater problem except by academic reasoning, since a practical examination of many systems will show that the superposition of any reasonable amount of water heating load on such peaks will have no effect on the available generating station or transmission line capacity. The truth of this assertion will be evident when one considers that the generating and transmission system will, from the nature of things, be adjusted to the early evening electric range load which is developed along with the water heater load, so that the effect of the water heater load itself on any part of the system outside of the local distribution is nil. This assumes of course that a two-way switch keeps the water heater off when the range is on.

Therefore one concludes that water heaters must be kept off the peak of the local distribution system to insure important savings in capital investment, regardless of whether they are kept off the system peak when it does not coincide with the local distribution peak.

Practical Requirements of the Device.

The device for such a purpose need not possess a high order of technical excellence, since its use is of a corrective nature only, and if successful in keeping 80 or 90 per cent of the water heaters off of the peak, it will serve all practical engineering purposes of the case. Emphasis should rather be placed on the low cost, stability, simplicity, and fool-proof qualities of the device rather than on technical excellence or the ability to adjust the switch to conform to seasonal changes of the peak or to furnish it with automatic features.

There have been developed time switches for this purpose embodying an eight-day clock throwing the heater on and off once each day and omitting the period prescribed as the peak. A relay device opens the circuit at the end of the sixth day, requiring the clock to be rewound and reset before it can be closed. This device is not fool-proof because if the clock stops at say 11 p. m. and its stopping is not discovered until next morning, it would be reset to 11 a. m., but the on and off mechanism would then possess a 12 hour lag unless the householder knew enough to handle the switch setting.

Another device is based upon the principle of choosing the branch-off from the residence cut-out box to the parlor cluster as the "key" to the peak. One side of this circuit is conducted over a thermostat couple so that when this circuit is energized, the thermostat closes a relay circuit carrying but 1/20 ampere, but this relay opens the main water heater circuit. The reverse occurs when the current of the parlor cluster circuit is off.

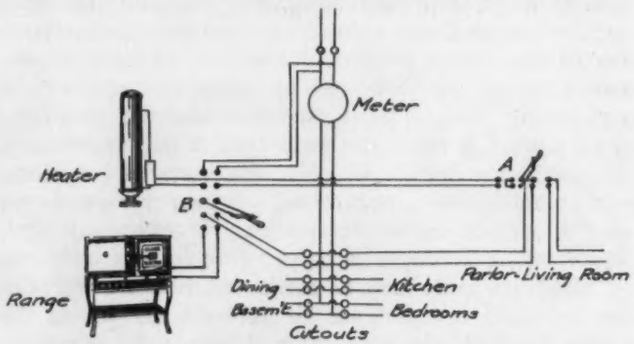


Diagram of Connection for Electric Water Heater.

This device is related to the first solution of the off peak water heater problem which was to have a simple throw over switch so that when the house lighting was "on" the water heater would be "off," which plan was discarded since it operated against the use of day load lamp-socket devices. This defect does not exist in the device described since the dining room, kitchen and bedroom circuits are available for lamp socket appliances without cutting off the water heater.

The accompanying diagram illustrates a simple plan that appears to solve the problem in the light of the above considerations.

Switch A can be realized by a stock snap switch built into the parlor wall. Switch B is the regular throw-over from range to water heater and may be had in snap switch type of 5 kw. capacity for about $4.00. The diagram shows the water heater connected for flat-rate operation although there is no difference in principle if connected inside of the meter.

This system has the following advantages:

1. It keeps the water heater off the local distribution system peak, which is the important peak to keep away from.

2. It permits water heater to operate even though lamp socket devices are used on all circuits of house except parlor circuit.

3. It is low in price and possesses no complicated automatic features.

4. It will perform its function except when the house is dark in the evening, thus keeping 80 to 90 per cent of the water heaters off of the evening peak.

REPORT ON COLUMBIA RIVER POWER PROJECT.

BY L. F. HARZA.

Appendix H—Canal, Generating Station and Equipment.

Canal. The amount of water to be carried by the power canal would vary between the minimum flow of 50,000 second feet and maximum of about 145,000 second feet at the flood limit of full capacity (flood of 800,000 second feet).

For this canal several locations have been studied, using different widths and bottom elevations. A velocity of about 5.5 ft. per second at maximum flow has been used, the resulting drop from intake to power house being about 1.5 ft. at 145,000 second feet. The section of canal adopted for purposes of estimate would have a bottom width of 325 ft., bottom elevation 70.0 ft., side slopes in rock of 1 on 4 up to elevation 100, and above this, on the river side of the canal, a rockfill wall with concrete lining 1 ft. thick on a hand laid rubble surface to secure watertightness on the canal side of the wall, and also up to the maximum flood level on the river side to prevent erosion of the fill. The slope on the river side would be 1½ on 1 and on the canal side 1 on 1. A section is shown on the general layout, Fig 7 (p. 394, Nov. 20, 1915, issue).

In places along the river side of the wall the normal slope would run out into the river, and a concrete retaining wall has for this reason been provided. At other places where changing section as at the upper end of the canal, rubble or reinforced concrete retaining walls backfilled with loose rock would be used. All retaining walls and the concrete surface on the river side would be provided with frequent weep holes at low points.

For the construction of the canal the S. P. & S. railroad would need to be moved through most of the distance further from the river. This relocation is shown on Fig. 7, the present location being indicated by dotted lines.

No head-gates have been provided for the power canal. They are not believed to be needed for protection of the canal bank, as this structure would be of permanent nature. A boom has been provided near the origin of the canal, diverting to a roller dam in the river wall immediately behind the flood gate piers; also one across the forebay of the power house.

Power house location. Big Eddy is a pool about 1500 ft. in diameter and having a general depth at low stage of probably about 150 to 200 ft., as judged from a few scattered soundings. The bottom along the power house shore deepens on a slope of approximately 2 on 1, as shown by the sounding contours in Fig. 9, (p. 394, Nov. 20, 1915, Journal of Electricity).

The construction of a cofferdam is in general impracticable and resort must be had to setting the power station back far enough from the shore line to permit the use of the natural rock for this purpose; and after completion, the excavation under water of this prism of rock. A core boring was made at the location shown in Fig. 9 and as described in Appendix A, to determine the general character of the rock as bearing upon its tightness for use as a cofferdam. A few small spring channels were encountered but were easily calked. The boring indicated a generally satisfactory condition, although it is of course to be expected that some grouting of springs would be required. It has been assumed that the natural rock cofferdam be built up in low places by a rockfill timber crib to a crest elevation of 65.00 ft. which would permit continuous work for any discharge less than 200,000 second feet.

Because of the high elevation (about 190) of the rock bench only a short distance back from Big Eddy, and part of which must be excavated for the forebay, it is desirable that the power station be built as narrow and as close to the shore line as possible. Space is not available for its location all in one straight line, as would be preferable, but the location has been so made as to require only one angle. Three locations have been shown in Fig. 7—one (A) by full lines, one (B) by dotted, and location (C) for which the ends only are shown to avoid confusion. In either location A or B it is planned to take the S. P. & S. railroad through an arched tunnel in the power house and to bridge both the forebay and tailrace. This could of course be avoided by making a detour around the end of the power house, but to do so would cost more than the proposed scheme, as indicated by such general information as was available without field survey, for which time and funds were not available. To make this detour would also add greatly to the total curvature of the railroad which would be undesirable.

Location A is preferable to location B, as it would save about 580,000 yards of rock excavation in forebay and tailrace. It would also permit the railroad to pass through the power house nearly at the turn in the latter and at right angles to its direction at that place. It would, however, involve the additional difficulty of constructing the power house across the deep bay of Big Eddy. The maximum depth at low water in this bay along the line of the power station is about 50 ft., and along the line of the cofferdam about 75 ft. A scheme for constructing this cofferdam has been developed and is believed to be entirely feasible at a cost which greatly favors this layout. Although final judgment on this matter must await further field investigations, the success of the cofferdam is believed to be sufficiently assured to warrant the adoption of this project for the estimates.

Location B is justified only to avoid crossing the bay of Big Eddy. In addition to being more costly, it introduces the railroad tunnel in a straight portion of the power house and thus obstructs the view of the entire generator room from the control gallery (which would be located at the bend), which although not essential is always desirable. The tunnel also passes through the power house at a flat angle and thus wastes much space.

Location C is much the cheapest of the three, the saving below location A being about $885,000, but the upper units would operate under a reduced head because of the drop in the river from their location to where the channel emerges into Big Eddy. It is not known whether this drop is of consequence or not and could not be determined without observations during high water which are not available, although it is known that the water is very swift and turbulent. The upper units in this location would also be exposed to a swift current and to possible ice floes mov-

ing parallel to the power station with danger of injury to the tailrace piers.

Power house layout. The layout for generating station shown in Fig. 7 provides for 24 main generating units although the estimate of machinery will provide for the installation of only 23 units, the additional space being provided for a possible future addition.

Space is shown in Fig. 7 for auxiliary exciter units, if used, between the angle in the power house and the railroad tunnel, although it is probable that exciters mechanically driven from the main generators would be chiefly used. The roof of the railroad tunnel would be about 68 ft. above the generator floor. It, as also the triangular space at the turn, would be built as an elevated switchboard gallery overlooking the generator room in both directions. This triangular space above the generator floor and under the switchboard gallery would be available for offices for the administrative and operating departments. There would be sufficient height for at least three floors in addition to the generator floor and the switchboard gallery on the top. There would be a clear opening along the generator floor of 30 ft. in height underneath the railroad tunnel, thus giving communication along this floor the entire length of the building. The long end of the power house would contain 19 units spaced 65 ft. apart, or with a length of 1235 ft. The short end would contain space for 5 units together with the railroad tunnel and exciter space, altogether 435 ft., making the entire length of building along the forebay or short side 1670 ft.

The generator room as shown in Fig. 8 (p. 389, Nov. 20, 1915, issue Journal of Electricity), would be about 76 ft. wide inside. This width is principally determined by the design of the substructure, but in any event should provide sufficient space to permit a generator rotor to be removed and placed on the floor.

The power house would be served by a traveling crane of 250 tons capacity, which is the approximate weight of the generator rotor, the heaviest part to be handled. This crane would be made to serve the entire station by providing a turntable for the truck on the inside, and a circular track for the truck on the outside of the bend in the power house. The trucks at the two ends of a crane are usually interlocked by shafting to which the motive power is applied. In this case the inside truck on the turntable could be temporarily disengaged while making the turn, or rollers on the turntable could be arranged to relieve the load on the rail and permit the wheels to turn without advancing.

The S. P. & S. railroad is now only single tracked; the tunnel would however be built for double track, but the bridges across the forebay and tailrace would be built either for two truss double track or as one-half of a three truss double track, the latter to save initial expense. In the latter case it would be desirable at any rate to provide a timber trestle for the second track to permit its use as a siding during construction. A partition would be built through the tunnel longitudinally between the two tracks. The roof of the tunnel used as a side track would be omitted during construction and the traveling crane could then unload all equipment directly from the cars.

The building between the gate operating platform and the generator room is capable of being built up to any desired height for such additional space as desired for low and high tension oil switches, transformers, lightning arresters, low and high tension busbars and similar apparatus. If used for high tension purposes, the outgoing lines would need to be carried through roof bushings because of the gate operating crane.

This space has been shown built up only enough for low tension apparatus, as it is assumed that most of the power from this station would be used by electro-chemical industries located nearby and using power at generated voltage. The cost of building up this space for high tension apparatus (which would require a redesign of the gantry crane) is properly chargeable to the transformation and transmission costs, which are not to be estimated in detail herein.

Fishladder. A fishladder would be constructed along the tailrace side of the power house as shown in Fig. 8. It would begin at low tailwater elevation at the upstream end of the power house and follow along the entire length of the building and around the farther end to the forebay. It would be supported from the building wall on brackets and would be built as an inclined concrete trough with frequent baffles and occasional deeper and level pools for resting places. Its average grade would be about 5.5 per cent.

Power house substructure. Fig. 8 shows a cross-section of the power house and a sectional plan of one penstock and scroll case. The design here shown was prepared solely for purpose of estimate but is believed to approximate the ultimate design with a fair degree of accuracy.

Each unit would require 65 ft. in length of power house, this length being occupied at the penstock entrance by four water passages each 10.5 ft. wide, three intermediate piers each 4 ft. thick and one main pier 11 ft. thick. The bottom of the forebay as shown is at elevation 69, agreeing with the bottom of the canal. The water would be screened by trash-racks spaced 4 in. apart and supported by horizontal concrete beams spanning between piers. From the entrance the water would flow through a spiral case formed in the concrete and possibly lined with steel, from which it would enter the turbine about the circumference and discharge at the bottom into the draft tube. From here its velocity would be decreased by a gradual expansion of the draft tube until discharged into the river at tailwater level.

Three grooves in the entrance piers are provided for closing off the water. The forward one is for inserting stop logs at rare intervals to make repairs to the guides of the main gate which occupies the second groove. This main gate would be built of structural steel rolling on trucks similar to those proposed for the Camere dam in a former chapter and sealed on all four sides by plates of spring brass. It could be built in one leaf or in two, and would be lifted by the gantry crane by means of chains reaching to the upper platform, or could be grappled in a manner similar to the

Camere gates. If not already heavy enough, it could be weighted with concrete to make it close under full pressure. The third slot is for a light wooden gate of which only a few would be provided; they would be used to deflect the leakage from the main gate into the drainage trough, from which the water would be discharged through a pipe into the tailrace by opening a sluice gate (not shown). A passage through the main piers, also shown in Fig. 8, would be provided with a control sluice gate and stop log slot and used for filling the penstock chamber before opening the main gates.

The forms of water passages here shown have been chosen with the purpose of decreasing as much as possible the center spacing of units and the width of the power house. The penstock entrance has been set low at additional cost for gates, partially to place it well below headwater, but principally to shorten the curve of approach and thus lessen the necessary horizontal distance from gates to turbines and therefore the width of the station. For the same reason the entire scroll case has been shown above the turbine inlet rather than about equally divided as usual. Some objection has been offered to this last feature because of its tendency to change the direction of flow in entering the turbine from that usually obtaining, and redesign might be shown by experiments to be necessary. Time has not been available in which to complete a design of the water passages, the chief purpose being to obtain a basis for estimates. For estimating the yardage of concrete, the deduction for openings has been made from the center line length of same and assumed velocities.

Generating units. The generating station would be equipped with 10 units driven by high head runners having a specific speed at best efficiency of 63, and with 13 low head units of specific speed 85.

The two types of turbine units have been so selected that each would have approximately the same capacity at the maximum head at which it would normally operate and would also operate at the same speed of 75 r.p.m.; so that all generators would be identical. Furthermore, the diameters at the turbine bands would be alike, permitting the use of identical draft tubes, the only difference in water passage being in the height of the turbine inlet or distributers. (This scheme was worked out in detail by Wellman, Seaver, Morgan Co., Cleveland, Ohio.)

Each type of unit would consist of a single cast steel runner with a diameter at the band of 19 ft. 8 in., which would also be the diameter of the upper circular end of the draft tube. The runner would be hung upon the lower end of a forged steel shaft 37 inches in outside diameter with 8 in. hole through the center and about 80 ft. long, built in three pieces. Each turbine would have a capacity under normal conditions of operation of 50,000 horsepower, which would be sufficient for driving the generator at the top. This generator would have a normal rating of 35,000 kilowatts at about 70 per cent power factor and 11,000 volts, with the usual overload capacity.

The character of the prospective loads, such as electrochemical, railroad and irrigation, would permit the use of 25 cycle generating machinery. If the proposed station were to supply surplus power to existing distribution systems for general light and small manufacturing business, 60 cycle would require to be generated by at least part of the units or by motor-generator frequency changers. The estimate has been increased for safety to allow for the use of some of the more expensive 60 cycle generators.

The generator rotor would weigh about 250 tons. The entire rotating element, including the generator rotor, the turbine runner and the shaft, would be carried by a Kingsbury thrust bearing supported by a spider on top of the generator frame. This complete rotor would have a weight of about 650 tons. The runners here proposed would weigh about 150 tons and be too large to be transported by rail in a single piece. They would therefore be cast in four pieces each, and put together on the work.

The nearest approach to turbines of the proposed size which have yet been reached are in the generating station of the Mississippi River Power Company at Keokuk, Iowa, and of the Cedars Rapids Manufacturing & Power Company on the St. Lawrence River about eight miles above Vandreuil, Quebec. The turbine runners at Keokuk have a diameter at the band of about 17 ft. and were partly cast in a single piece and partly in halves. The Cedars Rapids have a band diameter of 17 ft. 7½ in. and were cast in four pieces. It will thus be seen that the proposed runners would be only about 2 ft. larger in diameter than the largest yet built and about 2½ ft. larger than the Keokuk runners, a view of which was shown in plate V, (p. 390, Nov. 20, 1915, issue Journal of Electricity). They would moreover be subjected to a much greater head and would need to be built correspondingly strong. They are declared, however, by one of the manufacturers of the Keokuk and Cedars Rapids turbine to be well within the practicable and safe limits of manufacture and transportation. The electrical companies also declare that the manufacture of generators of the proposed size is entirely practicable.

Excitation. Excitation could be provided by the installation of three auxiliary hydraulic turbine driven units, generating alternating current at 2200 volts and each capable of exciting one-half of the main units; each main generator would then have an individual motor generator set for obtaining direct current for excitation. Or individual exciters could be mounted on the generator frame and connected mechanically to the generator. The latter method will be adopted for the estimates because of the large range of heads to which the auxiliary generator turbines would be subjected.

Good lighting as an accident preventive in industrial plants was discussed in a paper recently presented before the Illuminating Engineering Society by R. E. Simpson. In 1910, of 91,000 accidents reported, 23.8 per cent were due directly or indirectly to improper illumination. Numerous examples are cited to show how many of these accidents would have been obviated by adequate lighting. Most accidents were on stairways, passageways, and seldom-used parts of shops, the places most slighted as to illumination.

DIESEL ENGINE PRACTICE.

BY J. E. MEGSON AND H. S. JONES.

Diesel Engines Applied to Marine Purposes.

(Continued.)

In February, 1912, the "Selandia," the first marine Diesel engine installation built by Burmeister & Wain of Copenhagen, was completed. She is a twin-screw vessel with engines of 1000 b.h.p. each, four-cycle.

It may be interesting to note the results obtained with one of the latter Burmeister & Wain engines, by comparing the Diesel ship "Siam" with two steamships "Kina" and "Arabien." The ships belong to the same owners and the voyages are the first made by each ship.

S. S. "Kina" and "Arabien" are single-screw ships of the following dimensions:

Length	385 ft. 0 in.
Beam	53 ft. 0 in.
Draught	26 ft. 10¾ in.
Deadweight	8720 tons
Bunker capacity (coal)	770 tons

They were built in 1911 by Swan Hunter & Wigham Richardson and driven by triple expansion steam engines. They are the most economical and latest type of steamships in every respect.

The Diesel-engine ship "Siam" was built and engined by Burmeister & Wain of Copenhagen. The dimensions are:

Length	410 ft. 0 in.
Beam	55 ft. 0 in.
Draught	30 ft. 6 in.
Deadweight	9700 tons
Bunker capacity (oil)	1250 tons

The voyages made by these ships are the same, so that the results are well suited for comparison.

S. S. "Kina." first voyage June 16, 1911, to November 25, 1911:

Full outbound load in Antwerp—
8720 tons — 1162 tons = 7558 tons cargo.
Full homebound load from Sabang—
8720 tons — 932 tons = 7788 tons cargo
Mean Cargo—7673 tons.

Diesel-engine ship "Siam," first voyage, April 9, 1913, to October 4, 1913:

Full outbound load in Antwerp—
9500 tons — 493 tons = 9007 tons
Full home load in Hankow—
9500 tons — 1168 tons = 8332 tons
Mean cargo—8670 tons.

From the engine room report of these two ships, the following data are of interest:

	S. S. "Kina." 1st Voyage.	D. S. "Siam." 1st Voyage.
Duration of trip	163 days	182 days
Time passed at sea, engine working	109 days	107.5 days
Time passed in harbor	54 days	74.5 days
Distance in miles	27,808.0	27,818.0
Numbers of hours regular running	2,517	2,497
Manoeuvering	92	82
Mean speed, knots	11.0	11.14
Number of hours auxiliary engine running starboard		2,127.5
Number of hours auxiliary engine running port		1,666.5
Fuel consumption per mile	174.5 kg. coal (384.6 lb.)	40.25 kg. oil (88.7 lb.)
Lubricating oil consumption per I.H.P. per hr.	0.206 gr. (.0072 oz.)	1.64 gr. (.0577 oz.)
Fuel consumption for firing up	49.6 tons	0
Stand-by losses	31.6 tons	0
For full steam no propulsion	7.8 tons	0
Regular propulsion	4,415.0 tons	1,061.98 tons
Manoeuvering	71.9 tons	14.74 tons
Electric light	59.6 tons	19.04 tons
Heating	10.7 tons	0.6 tons
Winches and pumps	179.6 tons	23.84 tons
Fuel for main engine	4,576.3 tons	1,076.72 tons
Fuel for auxiliaries	282.3 tons	43.48 tons
Total fuel consumption	4,858.6 tons	1,120.2 tons

Economic results for one round trip, Europe, East Asia and back:

	S. S. "Kina." 1st Voyage.	D. S. "Siam." 1st Voyage.
Cargo	7,673	8,670
1000 tons of cargo carried one mile at a speed of about 11 knots at fuel consumption	22.8 kg. coal (50.3 lb.)	4.65 kg. oil (10.25 lb.)
Price of fuel per ton	$5.40 (coal)	$8.60 (oil)
1000 tons of cargo carried one mile at a speed of 11 knots at fuel expense of	12.3 cts.	4.0 cts.
Total fuel expense for a cargo load of 8500 tons for transportation from Copenhagen to East Asia and back (27,818 miles) at a speed of 11 knots	$30,300	$9,900
Outgoing cargo	8720 — 1555 tons = 7165 tons	
Cargo when plying between the West Coast and Japan	8870 — 1085 tons = 7635 tons	
Homebound cargo	8720 — 1120 tons = 7600 tons	
Average cargo for the whole voy- voyage about	7500 tons	

From the engine log book of these two ships the following items are of interest:

	S. S. "Arabien" 5th voyage.	D. S. "Siam" 2d voyage.
Duration of voyage	300 days	236 days
Time spent at sea engines working	183 days	140 days
Time spent in port	117 days	96 days
Distance in miles	45,676	34,819
Number of hours regular running	4,278	3,279
Number of hours manoeuvering	109	88
Average speed, knots	10.7	10.6
Number of hours auxiliary engine running port		2,539
Number of hours auxiliary engine running port		2,665
Fuel consumption per mile	186.4 kg. coal (410.8 lb.)	41.5 kg. oil (91.5 lb.)
Lubricating oil consumption per I.H.P. hour		0.866 gr. (.03 oz.)
Fuel consumption for firing up	66 tons	0
Stand-by losses	77.5 tons	0
Fur full steam no propulsion	16.95 tons	0
Regular propulsion	7,600.75 tons	1,357.9 tons
Manoeuvering	102.5 tons	18.3 tons
Electric light	149.75 tons	23.4 tons
Heating	49.25 tons	27.5 tons
Winches and pumps	396.25 tons	18.9 tons
Fuel for main engine	7,863.7 tons	1,376.2 tons
Fuel for auxiliaries	670 tons	69.8 tons
Total fuel consumption	8,533.7 tons	1,446 tons

Economic results for trip around the world:

1000 tons of cargo carried one mile at a speed of 10.6 knots at fuel consumption of	25 kg. (55.1 lb.)	4.9 kg. (10.8 lb.)
Price of fuel per ton	$5.40 (coal)	$8.60 (oil)
1000 tons of cargo carried one mile at a speed of 10.6 knots at fuel expense of	13.5 cts.	4.2 cts.
Total fuel expense for a voyage round the world covering 35,000 miles, which coincides with Diesel engine ship "Siam's case of 8500 tons at a speed of 10.8 knots amounts to	$40,000	$12,600

Attention is drawn to the following. The engine room attendance in S. S. "Kina" consists of 3 engineers, 2 assistant engineers and 14 firemen, a total of 19 men. In the Diesel ship "Siam" it consists of 4 engineers, 5 assistant engineers and 4 oil men, a total of 13 men.

S. S. "Kina" bunkered coal 10 times on the voyage. D. S. "Siam" bunkered oil twice on the voyage: the last time so much that the ship on the next trip over the same route only needed bunkering once.

Diesel ship "Siam": Second voyage: trip around the world. From Europe, South America to west coast of the U. S. A., from thence to Japan, China, Vladivostok and back through the Suez Canal:

Outgoing cargo	9500 — 780 tons = 8720 tons
Cargo when plying between the West Coast and Japan	9500 — 1056 tons = 8440 tons
Homebound cargo	9500 — 1215 tons = 8285 tons
Average cargo for the whole voyage about	8500 tons

S. S. "Arabien"; Fifth Voyage:

The steamship "Arabien" bunkered 14 times during the voyage. The Diesel-engine ship "Siam" bunkered only three times during the voyage, and of these one was caused by a mistake in the execution of the order.

At the end of the trip the remaining oil was sufficient to carry the ship back to the oil-supplying port without bunkering under way. A saving of about 68 per cent in fuel expense is the practical result obtained with the use of the Diesel-engined ship on the voyage. This included all consumption needed for loading and unloading, lighting, heating, etc. The extra saving by smaller crew, bigger cargo-carrying capacity of the Diesel-engined ship were not even taken into account.

The longer the voyages are without stopping, the more economical the Diesel-engined ships are.

The only condition in the choice of route to be taken for the Diesel-engined ship is that it should be such that the ship may enter ports where oil is available.

In 1912 Messrs. Sulzer Bros. installed engines in the "Monte Penedo." The two engines are two cycle, single-acting with four cylinders of 18.5 in. bore and 26.9 in. stroke, having a speed of 160 r.p.m. The data of the ship are:

Length	351 feet
Beam	50 feet
Depth	26.9 feet
Speed	10 knots
Deadweight	4000 tons
Bunker capacity	700 tons
Weight of engines and auxiliaries	160 tons
Power	1700 h.p.

The "Monte Penedo" engines are remarkable for the absence of inlet and exhaust valves. The only valves in the cylinder heads are those for fuel injection and starting air. It makes a simple cylinder head but involves complications in the cylinder wall. The exhaust takes place through openings in the cylinder wall forming one-half circle, whereas the other half of the periphery is taken by openings for scavenging air. Of those there are two rows, one above the other, and the communication between the air main and the top row of openings can be blocked by a double-seated valve. This arrangement serves to keep the scavenging air pipe closed at the beginning of the exhaust and then to keep it open after the exhaust is closed, thus preventing the exhaust gases from entering in the air line first and afterward securing an abundancy of fresh air at the start of the compression.

The "Monte Penedo" is probably the most successful two-cycle marine motor at present in service. After some trouble with the pistons on the first voyage (the extension required to shut the exhaust and inlet ports worked loose) the construction was altered, and since then the motors have given full satisfaction. It must not be forgotten, however, that these engines were of the best workmanship that can probably be found and were operated by trained engineers.

In 1913 the "Hagen," built by Messrs. Krupp started on her first trip. She is equipped with two single-acting two-cycle engines, each composed of 6 cylinders 18.9 in. bore and 31.5 in. stroke, running 140 r.p.m. The ship's dimensions are: 400 ft. long, 53 ft. beam and 32.3 ft. depth; carrying capacity, 8350 tons, speed, 11 knots; weight of machinery, 580 tons.

In 1914 the increase of ships with motors is quite remarkable.

Burmeister & Wain of Copenhagen delivered in 1914:

Name	Size of Ship Length x Beam x Depth.	I.H.P.	No. of Screws
Pacific	362 ft. x 51 ft. 3 in. x 25 ft. 6 in.	2000	2
Kronprince Gustaf Adolf	362 ft. x 51 ft. 3 in. x 25 ft. 6 in.	2000	2
Fionia	410 ft. x 53 ft. x 38 ft.	4000	2
Kronprincessin Margarete	362 ft. x 51 ft. 3 in. x 25 ft. 6 in.	2000	2
Malakka	410 ft. x 55 ft. x 30 ft. 6 in.	3000	2
Tonking	410 ft. x 55 ft. x 30 ft. 6 in.	3000	2

Werkspoor of Amsterdam has delivered the engines for:

Name.	Size of Ship Length x Beam x Depth.	I.H.P.	No. of Screws
Elbruz	375 ft. x 40 ft. x 29 ft.	2900	2
Ares	345 ft. x 46 ft. 6 in. x 27 ft. 5 in.	2300	2
Artemis	346 ft. x 46 ft. 6 in. x 27 ft. 5 in.	2300	2
Selene	346 ft. x 46 ft. 6 in. x 27 ft. 5 in.	2300	2
Hermes	346 ft. x 46 ft. 6 in. x 27 ft. 5 in.	2300	2
Jules Henry	305 ft. x 40 ft. x 23 ft	1350	2
Poseidon	185 ft. x 30 ft. 6 in. x 13 ft. 3 in.	450	1

(To be continued.)

WATERPOWER DEVELOPMENT ASSOCIATION.

A campaign of publicity, designed to aid the administration in securing the passage of laws to encourage the development of waterpowers in the public domain and the navigable streams, is to be conducted from Washington by the Waterpower Development Association, which is composed of manufacturers of water wheels, hydraulic and electrical machinery, equipment and supplies, whose business has been seriously injured by the stagnation in hydroelectric construction work in the last few years, and who look forward to a revival of the industry and an increased business when the general dam act and the leasing bill for power sites in the public domain, supported by the President and by Cabinet officers, are enacted into law.

In a statement issued by Marcus A. Beeman, secretary of the association, concerning its aims and purposes, it is asserted that the country has been greatly misinformed concerning the facts about the waterpower industry and the legislative situation, and the new organization proposes to carry on a campaign of publicity which will present the facts.

The affairs of the Development Association are in the hands of a committee made up of Harry W. Hand, vice-president of the I. P. Morris Company of Philadelphia, water wheel builders; W. W. Nichols, of the Allis-Chalmers Manufacturing Company of Milwaukee, makers of water wheels and electrical apparatus; Chester W. Larner, of the Wellman-Seaver-Morgan Company of Cleveland, water wheel manufacturers; J. E. Way of R. Thomas & Sons Co. of East Liverpool, O., insulator manufacturers, and Calvert W. Townley, of the Westinghouse Electric & Manufacturing Company of Pittsburgh, manufacturers of electrical apparatus and supplies. Marcus A. Beeman, secretary of the association, has been assistant secretary of the Cleveland and Buffalo Chambers of Commerce, and secretary of the New Jersey State Chamber of Commerce.

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Enhancing Utility by Beauty

The trend toward the beautiful is quite evident in recent designs of electric power houses and substations. Formerly these structures were erected with a view to fulfilling merely utilitarian purposes. As a result, they were too frequently blots upon the landscape, eye-sores to be shunned. Many an otherwise charming neighborhood was injured by its proximity to a power house or gas plant.

Of late years, however, more taste has been displayed in the construction of these buildings. Beauty was found to be compatible with utility. It was learned that an increase in fitness leads to an increase in beauty. Economy in material brought simplicity and eliminated the superfluous. Ornate embellishment was found to be ugly.

It is astonishing what harmony of form can be created with the most commonplace of building materials. The architect, by the exercise of his ingenuity, constructs an edifice which appeals to the imagination and thereby becomes beautiful.

Nor is this beauty confined to the architectural details. A bit of lawn, a stretch of garden, or even a gravel walk sets off the building and gives to it a distinction which pleases the eye. Vines are trained to hide a deformity, and a few shrubs can be planted to balance an inequality. Every reader can call to mind a number of recent power installation which conform to the dictates of the esthetic, and can realize how ugly these same types of buildings used to be.

The same harmony of form appears in the interior of the plant. Potted palms, tiled walls and flagged floors are not uncommon. Polished metal and marble switchboards make an attractive working place.

Such beauty is not wasted. It makes for better workmen. Operators are more efficient and careful in pleasant surroundings. Cleanliness is thus inculcated and greater safety secured. Fixing up a plant has done away with waste and brought order out of chaos. This tendency toward beauty is one which should be encouraged and commended wherever found.

Helping the Electrical Contractor

A remarkable result is being quietly achieved in bettering the electrical trade conditions of the West. Whereas confusion heretofore existed within and between every branch of the industry, all friction is being gradually removed and a smooth-running organization perfected.

This fact has been made evident by the reorganization of the several state associations of electrical contractors. Last fall the California association was put on a new and better basis, and during the past month the same result has been accomplished with the Oregon and Washington associations.

This improvement is of such importance to the welfare of all concerned that the publication of the new constitution and by-laws of the Oregon association is justified elsewhere in this issue. Next week a similar showing will be made for the Washington contractors, together with a statement of the principles upon which this action is based.

These principles of co-operation, as applied in Cali-

fornia, have already brought about cordial feelings of reciprocity between central stations, manufacturers, jobbers and contractors—to the financial profit of all. They have ironed out petty differences of opinion and brought a mutual understanding of each other's problems.

The contractor is the public contactor in the electrical business. He meets the consumer and can do much to make or mar public opinion. Through organization it has been possible for the contractor to learn the central station side, to appreciate the difficulties and to co-operate in disarming hostility, in converting ill will into good will. Neither is the bargain one-sided. The contractor has much to gain from the electric company, and is already reaping financial benefits.

One of the problems now engaging the attention of the far-sighted men of the industry is to stabilize merchandising conditions. The contractor has been too much of a mechanic and not enough of a merchant. The electrial business is still a specialty, and electrical purchases require expert advice. With a little instruction in salesmanship, a better appreciation of the need for more attractive salesrooms and a better understanding of business methods, the contractor is far better qualified to advise the purchaser as to his needs than is the non-electrical salesman. These slight deficiencies are to be supplied and thus the contractor-dealer given his legitimate position in the industry.

After these results have been accomplished in the three Coast states, it is hoped to establish the same desirable state of affairs in other states, and later to bring about a better national organization, based upon state representation. This result is being slowly effected without blare of trumpets. The men who are devoting their time to this betterment work should be met with cordiality and assistance. Thus within a few years the electrical contractor will become a prime credit risk, instead of being rated at the bottom, as at present. More power to them!

A Crude Determination of Accrued Depreciation

How to determine the depreciation of public utility properties is a much-mooted problem among engineers for public service commissions and companies. While depreciation is an actual matter of fact, its rate is a theoretical matter of opinion. All engineering structures are subject to a loss in value during the course of time, due either to the natural wear and tear or to inadequacy and obsolescency. As this loss increases, or accrues, with the lapse of time it is known as accrued depreciation.

Many methods have been devised for computing accrued depreciation. The simplest, and perhaps oldest, is the "straight line" method, which assumes that a plant has a definite length of life and a uniform rate of depreciation during its life time. For example, an electric plant may have a life of twenty years and depreciates at the rate of five per cent per annum. After ten years the property will have depreciated fifty per cent in value and after twenty years will have no value. It is like Oliver Wendell Holmes

. . . . . wonderful one hoss shay,
That was built in such a logical way
It ran a hundred years to a day,
And then of a sudden . . . . . .
. . . . . it went to pieces all at once,
All at once, and nothing first
Just as bubbles do when they burst.

This method is so simple that it has become a favorite with some engineers who do not seem to realize that simplicity and crudeness may be closely akin. While it is theoretically simple, it is still simply theoretical, and not wholly in accord with the depreciation observed in practice. Because of its crudeness and its failure to coincide with practical observations this method is gradually being superseded by other rules, apparently more complex but really more nearly in accord with the actual conditions existing.

Prominent among these other methods is the "sinking fund" rule which assumes that the time depreciation in value of equipment follows the same law as the time appreciation in value of money at compound interest. While this is a closer approximation to actuality its fails to recognize that the annual cost of repairs tends to increase as a plant gets older and to this extent is an approximation of a more elaborate but more rational formula.

Inasmuch as depreciation is the center about which valuation revolves too much emphasis cannot be placed upon the necessity for care in adopting the most delicate and refined methods of calculation. The straight line rule is such a crude method of computing accrued depreciation that it should be consigned to the limbo and some later and better method adopted in its place.

One further distinction that has too frequently been overlooked is that this theoretical accrued deprecitaion, however it may be calculated, is not real depreciation in the ability of a composite plant to render efficient service. "It is merely progress toward the necessity for expenditures for maintenance," as is admirably explained by Jared How elsewhere in this issue.

His argument is the same as was sustained last July by the Supreme Court of Idaho in the Pocatello Water Company case. It is based on the fact that a franchise carries with it the obligation to always maintain a composite public utility plant in condition to give efficient service. The plant is not worked to extinction, as is a mine, but is always ready to give as good service as when originally installed. This requires continual replacement of the component parts of the composite plant. The money for this maintenance is derived from the so-called depreciation fund, but is really an operating expense, just as is the oil consumed in operating a steam plant. If it were really a depreciation fund it would be used to amortize the investment and not to replace such portions of the property as shall have been consumed in the service.

To get the full purport of this argument it should be read as published. While some may not agree with its conclusions as a whole, it is certainly suggestive and tends to throw light on a much be-fogged issue. Unquestionably the application of the theory of deducting the theoretical accrued depreciation from the cost of reproducing the plant has deprived stockholders of their rights and the time is now ripe to have the question discussed and conclusively settled.

PERSONALS

C. C. Van Fleet, electrical dealer of Santa Rosa, spent a few days last week at San Francisco.

H. Jacobs, electrical contractor and dealer of Santa Rosa, was a recent business visitor at San Francisco.

W. E. Hayes, of the Hayes Electric Company, of Santa Rosa, spent a few days this week at San Francisco.

C. H. Carter, Los Angeles manager of the Pacific States Electric Company, was at San Francisco last week.

C. W. Dahl, of the Dahl Engineering Company, is again at work, after being recently injured in an automobile accident.

R. E. Frickey, electrical engineer with the Northern California Power Company, has returned to Redding from San Francisco.

Ross Hartley, branch manager of the Pacific States Electric Company, of Portland, Ore., was a recent visitor at San Francisco.

W. T. Goddard, chief engineer and president of the Locke Insulator Manufacturing Company of Hamilton, Ontario, is at San Francisco.

Guy W. Talbot, president of the Pacific Power & Light Company, has returned to Portland from a month's business trip in the East.

E. A. Quinn, general superintendent of the San Joaquin Light & Power Company of Fresno, spent a few days at San Francisco recently.

Wynn Meredith, member of the firm of Sanderson & Porter, has returned to San Francisco after an extended trip throughout the East.

Clem A. Copeland, mechanical and hydroelectric engineer, has established temporary headquarters at the Crocker Building, San Francisco.

Geo. Sherman, Western Electric Company, has returned to San Francisco after a short business trip to Seattle and the Northwestern territory.

A. J. Myers, Pacific Coast manager of the Wagner Electric Company, has returned to San Francisco after a brief business trip throughout Southern California.

A. G. Wishon, general manager of the San Joaquin Light & Power Company, in company with **J. H. Newlin,** purchasing agent, were recent business visitors at San Francisco.

Mr. Kihara, sales engineer of Takata, Japan, and the Japanese representative of the Westinghouse Electric & Manufacturing Company, is a recent arrival on the Pacific Coast.

E. A. West has resigned as efficiency engineer for the Portland Railway, Light & Power Company, to become chief engineer for the Denver Tramways Company, effective March 1, 1916.

Elmer Dover, president of the Oregon Power Company, has returned to Tacoma after completing arrangements for the transfer of the company's main offices from Eugene to Springfield, Ore.

R. C. Dawes, of Chicago, who is interested in gas and electric corporations in all sections of the country, and has spent a lifetime in organizing and directing such companies, is a recent visitor at San Francisco.

W. W. Low, president of the Electric Appliance Company, is at Del Monte, Cal., where he will remain until March 8th. He will then be at the San Francisco office of his company until March 27th, when he will return to Chicago by way of Riverside, Cal., and Dallas, Texas.

W. L. Harraden, lighting expert of the General Electric Company, who recently returned from a business trip throughout the San Joaquin Valley, reports that the education that was given to the public on lighting methods during the Exposition period is beginning to bring returns.

N. Kishi, chief engineer of the Osaka Electric Light Company of Osaka, Japan, arrived at San Francisco recently, from where he expects to start on a tour of inspection of all the large central stations in the United States, which he expects will take him about three months.

Jesse Blair, formerly connected with the Buffalo Engine Company, who has been for the past six weeks at the factory of the Busch-Sulzer Engine Company in St. Louis, watching the construction of one of their engines, which he is going to install and operate in the Hawaiian Islands, has recently arrived at San Francisco.

MEETING NOTICES.

California Section of the National Association of Electrical Inspectors.

The monthly beeting of the association will be held at 706 Ralto Building, San Francisco, on Saturday, March 4, 1916, at 2:30 p. m. Through the courtesy of the General Electric Company motion pictures of the Schenectady Works, the manufacture of Mazda lamps, and the application of electricity on the modern farm will be shown. These films are of an educational nature so that all members and those interested in the inspection field are urged to be present.

San Francisco Electrical Development and Jovian League.

A large and enthusiastic crowd was in attendance at the February 23d meeting to hear Loie Fuller explain the application of electricity in producing the wonderful effects of light and color used in her dances. R. M. Alvord presided as chairman, introducing C. F. Butte as chairman of the day. Mr. Butte had provided some unusual feminine vocal numbers and also introduced Mrs. A. B. Spreckels who urged participation in the tombola which is being given for the relief of the Belgian people. Miss Fuller gave an interesting account of her early efforts in using electric lights and also demonstrated her methods of decomposing light.

Los Angeles Jovian League.

The regular weekly luncheon was held Wednesday, February 23d, at Christopher's. Warren C. Kennedy, secretary of the Baker Iron Works, was speaker of the day and Roy Layton De Camp, also of the Baker Iron Works, acted as chairman of the day. President Holland announced the winners in the membership contest, the "Reds" under the leadership of R. C. Starr defeating the Blues," captained by R. McHugh, by a large majority. The winners will be entertained with a dinner at the expense of the losers. Mr. Kennedy who was formerly president of the Los Angeles Credit Men's Association, spoke on "Credits." He emphasized the importance of properly securing accounts either with contract, chattel mortgage, note with collateral security, trust deed, or bond; and stated that in extending credit it is his opinion that resources and character should be the principal considerations, and also that "An ounce of prevention is worth a pound of cure." He said in part: "A proper understanding of credit carries with it need of being posted on collateral subjects such as commercial law, costs of doing business, general financial and banking problems, accounting, cost keeping, fire, life, compensation, credit and marine insurance, experience in buying and selling, advertising, efficiency, legislation and taxation." Several pleasing numbers completed the program.

California Association of Electrical Contractors and Dealers.

The monthly dinner of the association was held at an Oakland cafe on Friday evening, February 25th, there being 85 in attendance. Robert King, as toastmaster, first introduced Mr. Bredhoff, secretary of the general contractors' association of Oakland, who gave an interesting address on the relationship which should subsist between the general contractor and the sub-contractor. He congratulated the electrical men on the effectiveness of their organization and suggested that similar associations among the other trades would

be to the benefit of all. The relationship of all branches should be amicable, it should discourage peddling of bids and should encourage fair play and fair dealing.

John Bray, credit man for the Western Electric Company, then read a suggestive paper on "Co-operation between the Contractor-Dealer and the Credit Man." He urged the contractor to seek the credit men's advice as a business efficiency expert as regards better office methods and in showing the relation of expense to sales or profits. He explained how the granting of long credit terms decreases the jobber's profit by decreasing the turn over on the investment. With a merchandise investment of 60 days, a 60-day receivable investment, as compared with 30-day collections, gives a turnover of three times a year instead of four, a loss of 25 per cent on the net profit through carrying the receivable investment an extra thirty days. Accounts that run continually over 90 days are unprofitable. He also showed how easy credit terms worked to the disadvantage of the established contractor and dealer. He offered the assistance of the credit men in helping the contractor increase his sales, increase his profit, help his collections and keep down losses from bad accounts.

Robt. Martland, formerly an electrical contractor and now secretary of the California Automobile Supply Dealers' Association, gave a spirited and inspiring talk on the benefits of organization. In 19 months his association has grown from nothing to 600 members, credit conditions are 80 per cent better, and ruinous price cutting has ceased. He suggested that it is better to lay awake at nights trying to figure how to maintain the organization and not how to beat it.

J. W. Redpath, secretary of the association, told briefly of the encouraging conditions of the association.

W. L. Goodwin, after recounting the deplorable state of affairs that has existed among the Washington electrical interests, announced the recent organization of the Washington association and the re-organization of the Oregon association along the same lines as have been adopted in California. He also emphasized the advantage of a contractor being a dealer.

R. H. Holabird told of progress in the socket appliance campaign being conducted in conjunction with the Pacific Gas & Electric Company. C. C. Hillis warned the contractors to remember the recent advance in the prices of materials when figuring jobs, so as to allow adequate profit. Other speakers spoke briefly on similar lines, after which the meeting was adjourned.

PINCHOT OPPOSES WATER POWER LEGISLATION.

The following letter to the editor outlines the plans of Gifford Pinchot to defeat the Congressional legislation for the development of water power. It is published for the information of Western men and indicates the extreme to which this campaign is being carried:

To the Editor—Sir:

I write to ask your help to defeat a most serious attack on our public resources. Since the fight over the Alaska resources was won there has not been so pressing a threat against the conservation policy as the present effort in Congress to give our public water powers for nothing into monopolistic control.

The Shields Bill, now before the Senate, gives to the power interests without compensation the use of water power on navigable streams. The amount of water power these streams will supply is larger by far than all the power of every kind now in use in the United States. It pretends to, but does not, enable the people to take back their own property at the end of fifty years, for in order to do so under the bill, the Government would have to pay the unearned increment, and to take over whole lighting systems of cities and whole manufacturing plants. Private corporations are authorized to seize upon any land, private or public, they choose to condemn.

Bills which gave away public water powers without due compensation were vetoed by President Roosevelt and President Taft. The Shields Bill would do precisely the same thing today.

Another water power bill, the Ferris Bill, relating to the public lands and National Forests, was in the main a good bill as it passed the House. As reported to the Senate, it encourages monopoly by permitting a corporation to take as many public water power sites as it may please. Under it the corporations could not even be kept from fastening upon the Grand Canyon, the greatest natural wonder on this continent. This bill takes the care of water powers on National Forests from the experienced and competent Forest Service, and gives it to the Interior Department, thus entailing duplication and needless expense.

In my opinion, there is undue carelessness as to the disposal of public resources at present in Washington. The water power legislation now before the Senate is too favorable to the men who, as Secretary Houston's admirable recent report shows, control through 18 corporations more than one-half of the total water power used in public service throughout the United States. The water power men charge that conservation hampers development. The Houston report shows, on the contrary, that the most rapid development is in the National Forests, where conservation is best enforced. On the other hand, 120 public service corporations own and are holding undeveloped and out of use an amount of water power equal to four-fifths of all there is developed and in use by all the public service corporations in the whole United States.

As I said in an open letter of January 29th to the President:

"Natural resources lie at the foundation of all preparedness, whether for peace or for war. No plan for national defense can be effective unless it provides for adequate public control of all the raw materials out of which the defensive strength of a nation is made. Of these raw materials water power is the most essential, because without electricity generated from water power we can not manufacture nitrates, and nitrates are the basis of gunpowder. There are no great natural deposits of nitrates in the United States as there are in Chili. It would be folly to allow the public water powers, which can supply this indispensable basis of national defense, to pass out of effective public control."

A concerted movement is on foot to break down the conservation policy. Feeble resistance or none at all is being made by official Washington. Unless the press and the people come to the rescue, the power interests are likely to win. This is a public matter wholly removed from political partizanship. Your help is needed, and that of your paper. For nearly ten years this fight for the public water powers has gone on. We ought not to lose it now.

Sincerely yours,

Milford, Pa., Feb. 15, 1916 GIFFORD PINCHOT.

NEWS OF OREGON PUBLIC SERVICE COMMISSION.

April 17th has been set as the date for hearing the complaint asking for an interchange of telephone service between the Pacific Telephone & Telegraph Company and the Home Telephone Company.

NEW CATALOGUES.

The Western Electric Company has a new edition, the sixth, of the complete little handbook "How to Figure Illumination" ready for distribution. This booklet lists complete tables and full illuminating data as well as illustrating and describing with complete characteristics all the various sizes and styles of Sunbeam Mazda lamps.

CONSTITUTION AND BY-LAWS OF THE OREGON ASSOCIATION OF ELECTRICAL CONTRACTORS AND DEALERS, ADOPTED FEB. 9, 1916.

Section 1. **The name** of this association shall be the Oregon Association of Electrical Contractors and Dealers.

Sec. 2. **Its objects** are to promote the welfare of its members and to distribute among them the fullest information obtainable in regard to all matters affecting the business of the electrical contractor and dealer.

To encourage its members in establishing attractive retail stores where the consumer may obtain his requirements of electrical material.

To aid in bringing about a more friendly relation between the electrical contractors and dealers, and to promote home industry by co-operation with manufacturers and wholesalers, who maintain stocks and organizations in the territory of its members.

To assist in standardizing and marketing high grade electrical merchandise of American manufacture and by encouraging the proper installation reduce the fire hazard by co-operating with the National Fire Protection Association, the Board of Fire Underwriters of the Pacific and local municipal electrical inspection departments.

To improve the standard of specifications by co-operating with the American Institute of Electrical Engineers, American Institute of Architects and local chapters of same, Northwest Electric Light & Power Association and municipal lighting and power plants and by closest co-operation assist them in solving the problems which will improve the service to the consumer.

To encourage the more general use of electrical appliances by encouraging its members to affiliate with and support the work of the Society for Electrical Development.

To encourage and support local Electrical Development Societies.

Sec. 3. The general offices, as well as branch offices, shall be located at such places as the executive committee may from time to time determine.

Sec. 4. The jurisdiction of the Association shall extend to all places within the boundaries of the State of Oregon.

Sec. 5. **Application for membership** must be made in writing to the secretary-treasurer of the association, and must be accompanied by an amount equal to the initiation fee and the first quarter's dues in accordance with Section 12.

Sec. 6. **The membership** shall be composed of regular and associate members. A regular member is an individual, firm or corporation in Oregon engaged exclusively as an electrical contractor or dealer.

Sec. 7. **Associate membership** shall be divided into two classes, namely: "A" and "B."

Class "A" membership comprises all central stations, municipal light and power plants, telephone companies and electrical railroad companies and companies of like character.

Class "B" membership shall comprise any individuel, firm or corporation, except those qualified as regular or Class "A" Associate members engaged in any branch of the electrical business, but who do not do installation work, and also any retailer handling electrical material but not engaged exclusively in the handling of the same, and also any electrical dealer or contractor coming within the division of a regular member, but operating in a territory outside of the State of Oregon and also electrical engineers.

Sec. 8. For the purpose of determining whether an individual, firm or corporation is engaged in the business of electrical contractor or dealer, the following definition shall be used:

An electrical contractor or dealer shall be any individual, firm or corporation carrying a general stock of electrical supplies or who may be prepared to make electrical installations.

He shall have an established location where he transacts his business with the public and must have displayed any ordinary sign or placard announcing the character of his business, and shall maintain the usual set of books and records incident to the conduct of any ordinary business.

He shall carry a stock of electrical supplies of not less than two hundred and fifty dollars, ($250) for the performance of electrical installation work.

He shall not engage in the use of such tools for the purpose of making installations, nor perform any physical labor usually performed by mechanics hired for the purpose, provided however, that in a firm composed of two persons (other than husband and wife) or more, one of them may perform the services of an ordinary mechanic.

No member of a firm engaged in the use of tools in installation work shall represent his firm in this association.

But the executive committee, by the concurrent vote of not less than two-thirds thereof, may admit to membership any electrical contractor or dealer, who does not qualify in all respects, under the above definition.

Sec. 9. The membership shall stand in the name of an individual, as representing the person, firm or corporation and the secretary-treasurer shall recognize such persons as authorized to represent as a member such person, firm or corporation with power to vote at meetings.

Each individual, firm or corporation shall be entitled to name, in addition to the representative in whose name its membership shall stand, an alternate, but no individual, firm or corporation shall change its representative, or alternate, during any fiscal year of the association, except with the approval and consent of two-thirds of the members present at any general meeting, or two-thirds of the executive committee present at an executive meeting.

Sec. 10. **A Membership Committee** shall pass on all applications for membership.

The membership committee shall comprise not less than five members inclusive of the president, a vice-president and three members at large in the city or territory from which the application originates.

The members at large shall be appointed by the president when applications are received.

Any applicant who receives a majority vote of the memberhip committee shall be declared duly elected. If the applicant does not receive a majority vote of the membership committee, it shall be the duty of the secretary-treasurer to submit the application at the first regular meeting following of the association. Applications will then be submitted to the members at large, together with a full report from the secretary-treasurer, giving the result of the votes of the membership committee.

If the applicant receives a two-thirds vote of members voting at any regular session, he shall be declared duly elected.

Sec. 11. The fiscal year shall begin the first day of January of each year and shall end on the following 31st day of December.

Sec. 12. **The initiation fee** of all classes of members shall be $10.00 and the annual dues shall be $36.00. The dues shall be paid quarterly, in advance, on the 1st day of January, April, July and October.

If, however, any member remits for his dues within thirty days after due date for the fiscal year he shall be entitled to a discount of 20 per cent.

Every member shall pay dues for the quarter during which he is elected as follows: If elected during the first month of such quarter he shall pay full dues for such quarter; if elected during the second month of such quarter, he shall pay two-thirds of such dues; and if elected during the last month of such quarter, he shall pay one-third of such dues.

Sec. 13. Any regular member operating a branch house shall pay additional dues for said branch equal to 50 per cent of the dues of any regular member and subject to the same discount. For the purpose of determining what is a branch house, the following definition shall apply: A branch house shall comprise an establishment operating as is defined in

the definition of a regular member, provided, however, that said branch is operated under the identical name of the main house. If, however, the name of the branch differs in any way from the name of the main house it shall be constitued as separate membership. Nothing in this definition shall be construed as meaning that a branch shall be defined where a regular member establishes a temporary office in another location for the purpose of making an individual installation.

Class "A" Associate Membership entitles the said Class "A" Associate Member to nominate one representative and one alternate, one of whom may attend all meetings of the association and receive all literature distributed.

Class "A" members may appoint additional representatives who will have the privilege of attending all meetings and receive all literature distributed by the association upon the payment of $1.00 per year for each additional representative so named.

Associate members shall be entitled to attend all meetings of the association and receive all literature distributed, but shall not however, be entitled to vote.

Sec. 14. Upon majority vote of the executive committee, the initiation fee may be suspended or reduced for a period not exceeding any one quarter, and in the event of the reduction of the initiation fee, the executive committee shall determine the amount of initiation fee during the quarter so affected.

Sec. 15. Any member may be expelled from the association for non-payment of dues, after a period of ninety (90) days from the date when the said dues become due and payable.

The membership of any member suspended as aforesaid who fails to pay such dues within ninety (90) days after suspension shall as a result of such failure and without further action in the premises terminate unless said period of ninety (90) days be extended by the executive committee, in which case his membership shall without further action terminate at the end of the extended period.

Sec. 16. Subject to instructions given by resolution passed in general meeting, the management of the association's affairs shall be vested in the executive committee.

In the absence of instructions on any subject, the said executive committee shall have power to act at its discretion, but its action shall be subject to the subsequent alteration, amendment or repeal by the members present at any subsequent meeting.

Sec. 17. **The officers** of the association shall be a president, elected by ballot at the annual meeting of the association, as many vice-presidents as there are territories, elected as is hereinafter specified and a secretary-treasurer, who shall be chosen by the executive committee as hereinafter specified.

Sec. 18. **The Executive Committee** shall be comprised of the president, vice-presidents from each territory, elected as hereinafter specified, and two members at large.

Only individuals representing regular members shall be qualified to act as members of the executive committee.

In the event that it is impossible for any member of the executive committee to attend any meeting of such committee the secretary-treasurer may appoint a substitute located in the same district as such member to attend in his place.

Sec. 19. As many vice-presidents as there are districts shall be elected by ballot at the annual meeting and shall hold office for one year or until their successors are elected and qualified.

The members to be voted on for vice-presidents representing particular districts shall be chosen as follows:

The members located in each district shall, five days previous to the annual meeting, send to the secretary-treasurer of the association for election as a vice-president, the names of one or more members, located in their district, which names shall be submitted for vote at the annual meeting and the member for whom the highest number of votes are cast shall be declared elected vice-president for such district.

The members in each district may determine in any manner they deem best the name or names to be submitted for vice-president.

Upon failure of the members of any district to nominate in accordance with the above section, one or more members for election as vice-presidents, the excutive committee is empowered to elect a member from such district to fill the vacancy.

There shall be nominated by the regular membership in each territory, from the regular members a vice-president, provided, however, that where the total regular membership in any territory is more than ten, an additional vice-president shall be nominated for each additional ten regular members or fraction thereof.

Sec. 20. The executive committee shall have the power to appoint such sub-committees as it may from time to time deem necessary.

Sec. 21. The entire state will be divided into three districts, to be numbered from one to three respectively and the territory included in each district shall be as follows: District No. 1, All that part of the state lying west of the Cascade Mountains and north of the 45th parallel of latitude, including Salem, Oregon. District No. 2, All that part of the state lying west of the Cascade Mountains south of Salem and the aforesaid parallel. District No. 3, All that part of the state lying east of the Cascade Mountains.

Sec. 22. The secretary-treasurer shall be chosen by the executive committee and his compensation shall be fixed by such committee. He shall keep the books of the association and shall perform such duties as may be delegated to him by the executive committee.

Sec. 23. Where it is deemed advisable to establish district offices of the association, the members of all such districts to be covered by such branch office may select an assistant secretary, who shall be subject to the orders of the executive committee and of the general secretary.

The salaries of the district secretaries shall be fixed by the executive committee.

Sec. 24. The secretary-treasurer of the association shall be custodian of the association funds. He shall deposit such funds with banks or trust companies approved by the executive committee and shall file with each of such banks and trust companies a copy certified by the president, of section 24 of these by-laws.

He shall furnish a bond in an amount to be determined by the executive committee and the expense of such bond shall be borne by the association.

The executive committee shall employ a certified public accountant who shall annually audit the account of the secretary-treasurer. Such public accountant shall file a written report of his investigation with the president and such reports shall be read at the next regular meeting.

The executive committee shall appoint a committee of five of which the president and secretary-treasurer shall be members, to have control of and to direct the disposition of the funds of the association. No limitation shall be placed upon said committee's power to draw on and distribute the funds. The action of this committee must have the consent and approval of a majority of its members.

Sec. 25. The association shall hold a general meeting at least once in every ninety days at such time and place as may be determined by a majority vote of members present at any previous meeting.

Sec. 26. The executive committee shall designate one of the quarterly meetings as the annual meeting.

Sec. 27. Meetings of the executive committee shall be held upon request of three of its members or upon the call of the president or secretary-treasurer at such time and place as may be designated by them or him.

Sec. 28. Each and every action taken at any quarterly

meeting must be in conformity with the constitution and by-laws of the association.

Sec. 29. A majority of all members of any committee shall constitute a quorum.

Sec. 30. The members present at any quarterly meeting shall constitute a quorum.

Sec. 31. A vote on any question by any members of any body or committee may be taken by mail or telegraph and such votes shall have the same force and effect as though given at a duly convened meeting.

Sec. 32. The president shall preside at all meetings and in the event of absence of the president at any meeting, by majority vote of the members present, one of the vice-presidents shall act as chairman of the meeting.

Sec. 33. The executive committee shall elect annually as counsel, a regular practicing attorney, prescribe his duties and determine his compensation.

Sec. 34. Resignations shall be addressed and sent to the secretary-treasurer and shall be thereafter acted upon at the next meeting of the executive committee and the member resigning shall be amenable to all rules and regulations of the association to the date of such meeting.

Sec. 35. By a two-thirds vote of the entire executive committee, any member may be expelled for cause, provided, however, that such member is given an opportunity to be heard before the said committee. On the question of such expulsions neither the accusing nor the accused member shall be entitled to vote.

Sec. 36. The constitution and these by-laws may be revised and amended at any general meeting provided that such revisions or amendments are submitted in writing to the secretary-treasurer at least thirty days in advance of any regular meeting. It shall be the duty of the secretary-treasurer to forward to each member at least ten days in advance of any regular meeting copy of such proposed revision or amendment.

Sec. 37. Except where otherwise provided Roberts Rules of Order shall govern the parliamentary procedure of this organization.

Oregon Electrical Contractors' Association.

Beaver Electric Co., Portland, Ore.
Boicourt Electric Co., Portland, Ore.
Grand Electric Co., Portland, Ore.
H. M. & H. Electric Co., Portland, Ore.
E. L. Knight & Co., Portland, Ore.
Morrison Electric Co., Portland, Ore.
NePage, McKenney Co., Portland, Ore.
Pierce, Tomlinson Electric Co., Portland, Ore.
Robt. Skeen Electric Works, Portland, Ore.
Smith, McCoy Electric Co., Portland, Ore.
Portland Electric Main. Co., Portland, Ore.
Walker Electric Works, Portland, Ore.
M. J. Walsh Co., Portland, Ore.
West Coast Engineering Co., Portland, Ore.
Western Electric Works, Portland, Ore.
Burgey Electric Co., Vancouver, Wash.
Cole & Cummings, Corvallis, Ore.
V. I. Fuqua, Forest Grove, Ore.
J. B. Hope, Electrical Supply Co., Lebanon, Ore.
Hunter Electrical Co., Eugene, Ore.
Newton Electric Supply Co., Albany, Ore.
Owl Electric Co., Hillsboro, Ore.
Ewart Electric Co., Astoria, Ore.
Pettingell, the Electrician, Salem, Ore.
B. W. Paul, Medford, Ore.
Ralston Electrical Supply Co., Albany, Ore.
Salem Electric Co., Salem, Ore.
Scott Electric Co., Astoria, Ore.
Smith & Ellison, Dallas, Ore.
Standard Electric Co., McMinnville, Ore.
The Dalles Electric Co., The Dalles, Ore.
J. L. Vaughan, Pendleton, Ore.
Welch Electric Co., Salem, Ore.
Fred B. West, Dallas, Ore.
Witzig Electric Co., Corvallis, Ore.

TRADE NOTES.

The Alexander & Lavenson Electrical Supply Company, who were formerly at 633 Howard street, recently moved their offices to 168 Second street, San Francisco.

The Ward Leonard Electric Company, Bronxville, N. Y., manufacturer of electric devices, has appointed John B. Sebring Company, Baum boulevard and Euclid avenue, Pittsburgh, Pa., as their district sales agent. Mr. Sebring is well known in the Pittsburgh community.

NEW CODE RULING ON KNOBS.

A time limit of June 1, 1916, has been set by the Board of Fire Underwriters of the Pacific to discontinue the use of non-Code split knobs, No. 5½ solid knobs and single braid wire in sizes of No. 6 B. and S. gage and larger. This date was determined only after a survey of stock on hand in this territory so that it is felt that undue hardship will not be wrought.

Sec. 64-C of the Code requires No. 5½ circular split knobs to be one and one-eighth inches in diameter and to afford the wire at least one inch separation from the surface wire over. The split knob heretofore most commonly used in this territory has a diameter of one inch. Sec. 16-b requires that split knobs must be used for the support of conductors smaller than No. 8 B. and S. gage. This will require the use of split knobs at all locations for wires smaller than No. 8 B. and S. gage. The present rule requires solid knobs at turns, strains, dead ends, etc., but split knobs must now be used at these points.

In amending this rule by the Electrical Committee of the National Fire Protection Association it was felt that with the small wires they could not be properly supported by tying to solid knobs.

Sec. 26-27, and 28 require wires to be double braided for sizes No. 6 B. and S. and larger. This amendment will govern for all classes of construction. The above provisions have been agreed to by members of the California Section of the National Association of Electrical Inspectors, so that a uniform application of the new rules is looked for.

NATIONAL ELECTRICAL CONTRACTORS' CONVENTION.

The 16th annual convention of the National Electrical Contractors' Association will be held at New York City July 17-22, 1916. The headquarters will be at the Hotel McAlpin. The following program has been prepared:

Monday, July 17th—10 a. m., meeting of the National Executive Committee.

Tuesday, July 18th—10 a. m., meeting of National Board of Directors.

Wednesday, July 19th—10 a. m., opening of convention. Session open to all. Speakers: Address of Welcome, Lewis H. Woods, president New York State Association; address by John R. Galloway, president the National Electrical Contractors' Association; address by Hon. John Purroy Mitchell, mayor of New York City; James H. McGraw, president of the McGraw Publishing Company, subject, "The Society for Electrical Development and Its Relation to Merchandising"; T. Commerford Martin, official secretary National Electric Light Association; Arthur Williams, New York Edison Company; 2 p. m., business session, open to members only; 9 p. m., reception and dance in the blue and green room, Hotel McAlpin.

Thursday, July 20th—10 a. m., business session, open to all in the electrical contracting business, whether members or not; 10:30 a. m., ladies to visit one or more department stores for parade of gowns, etc.; 2 p. m., business session for members only; 2:30 p. m., for ladies and guests, exhibition of Aeolian and new talking machine at Aeolian Hall, 42nd street; 7 p. m., automobile ride to Coney Island.

Friday, July 21st—10 a. m., business session for members only; 3 p. m., special train on Long Island road, leaving Pennsylvania Station, to Hotel Trouville, Long Beach; 4 to 6:30 p. m., surf bathing, etc., at Long Beach; 6:30 p. m., dinner-dance and entertainment.

Saturday, July 22d—9 a. m., organization meeting of the National Board of Directors; 10 a. m., organization meeting of the National Executive Committee; 11 a. m., leave hotel for special boat, "Seeing New York by Water," a complete circle of the city will be made and light lunch served on board, landing about 4 o'clock.

NEWS NOTES

ILLUMINATION.

PETALUMA, CAL.—The Cinnabar Lighting District was organized at a recent election.

SILVERTON, ORE.—The Portland Railway, Light & Power Company is preparing to extend its service to East Silverton.

OAK HARBOR, WASH.—A franchise for a lighting and water system at Oak Harbor has been granted the Whidby Island Electric & Power Company.

PASADENA, CAL.—The county supervisors have set the date for the election looking to the formation of Lamanda Park ornamental lighting district for March 18th.

RED BLUFF, CAL.—The city trustees have awarded the contract for the installation of a lighting system on Main street to the Northern California Power Company on its bid of $2850.

CASA GRANDE, ARIZ.—This place has voted bonds for a municipal water, electric light and ice system. Proposals for bids relating to the construction of the plant will be published at once.

LOS ANGELES, CAL.—The board of supervisors has heard protests on the formation of the Graham Lighting District and has adopted a resolution calling an election to be held March 18th.

POMONA, CAL.—The city council has ordered that cast iron lighting posts and appliances for street lighting purposes, be installed on Park Drive, Kenoak Drive, South Kenoak Drive and Orange Grove Avenue.

SANTA BARBARA, CAL.—It is reported that more than 50 per cent of the frontage on State street between De la Guerra and Yanonali streets has been signed for ornamental lights. It is hoped to get enough signers to carry the work along the remaining two blocks to the beach. The council will be asked to create a district and order lights installed on the front foot plan.

TRANSMISSION.

PASADENA, CAL.—It has been learned that Pasadena has acquired a right of way for a municipal power line to the city limits of Los Angeles. It is reported that this is to be leased to Horace M. Dobbins, owner of the railroad right of way.

NORTH YAKIMA, WASH.—The Pacific Power & Light Company will reconstruct the Sunnyside substation, installing a loop and oil switches. Distributing lines will be extended west from Sunnyside to connect with those from Toppenish.

SPRINGFIELD, ORE.—Following the sale of the Oregon Power Company's distributing lines and substation to the City of Eugene, the company's chief office will be moved from Eugene to Springfield, where the company's largest plant is situated.

BARSTOW, CAL.—The Southern Sierras Power Company is making arrangements to extend its lines from Kramer to Barstow. From Barstow power will be distributed to the Hinkley valley and then east by way of Yormo and Newberry to Ludlow and Needles.

CLAREMONT, CAL.—Application has been made to the board of trustees by the Southern California Edison Company for a 30 year franchise to distribute electric energy to be used for any and all purposes. Sealed bids will be received for said franchise up to April 3d.

YREKA, CAL.—The new management of the California-Oregon Power Company will shortly commence extensive developments at Copco, this county. Additional men have been employed to rush the work. The power dam will be raised to an elevation of 60 feet if present plans are carried out.

PORTERVILLE, CAL.—E. G. Shore, superintendent of the Porterville division of the Mt. Whitney Power Company, appeared before the city council last week to secure a permit for the construction of the new substation which the corporation is to erect on its property at Putnam avenue and Fourth street. The plant, it is stated, will represent an investment of $40,000.

AUBURN, CAL.—Preparations are under way for the erection of the Wise power house, the lowest on the Drum system of the Pacific Gas & Electric Company. The company has transferred its force from Christian Valley to Auburn Ravine, just below town, and things are being gotten into shape for the erection of the cement foundations for the building, machinery and penstock.

SPOKANE, WASH.—At a point where the Pend Oreille River is confined within a channel 18 ft. wide in the Zig-Zag canyon below Metaline Falls, surveyors and engineers are completing exploration work preparatory to the erection of a dam and power plant capable of generating 400,000 h.p. It is supposed that considerable of the power will be taken by the Milwaukee railroad in the electrification of its Idaho & Washington Northern line and other branches.

TELEPHONE AND TELEGRAPH.

UKIAH, CAL.—The McDowell Valley Rural Telephone Company was organized at a meeting in Hopland. A new telephone line 7 miles long is planned.

RICHMOND, CAL.—Bids will be received up to March 20th for a 41 year telephone franchise, as applied for by the Pacific Telephone & Telegraph Company.

PLAINSBURG, CAL.—The Plainsburg Rural Telephone Company has been organized by farmers of Plainsburg, Le Grande and vicinity. E. D. Kahl is president and E. L. Motley secretary.

HAILEY, IDAHO.—The business men of Bellevue and farmers of Glendale and Stanton have taken steps to construct a rural telephone line that will connect every ranch in the two precincts.

LOS ANGELES, CAL.—As the result of a careful canvass of fifty widely varying lines of business using the pay telephone, Fulton Lane, president of the public utility commission, has filed a report with the city council that 66 per cent are well satisfied with the system, 30 per cent expressed dissatisfaction and 4 per cent were indifferent. The report shows that 60 per cent of the money received by the telephone companies from this source come from tourists and out-of-town people, and the conclusion drawn by President Lane is that this service is more economical and beneficial to the present subscribers than was the old system.

TRANSPORTATION.

PORTERVILLE, CAL.—Plans for laying several miles of track along the foothills in the Porterville section and electricizing this part of the system are under consideration at the present time by the Southern Pacific Company. In general the plan is to build a line from Merryman on the Visalia Electric east of Exeter south along the foothills, about two miles east of the main line, through the El Mirador colony and Frazier Valley to Success, where connection will be made with the Porterville Northeastern. It is also planned to build a line from a point near Adobe on the P. N. E. south along the foothills for several miles, connection with the main line to be made at Ducor. Cross lines from the foothill lines to the main line are to be built at various points.

ALPHABETICAL INDEX TO ADVERTISERS

The letter and number before each name are used in the classified page following

A-1 American Ever-Ready Works of National Carbon Co.. Los Angeles; 755 Folsom St., San Francisco; Seattle.

A-2 Atchison, Topeka & Santa Fe Railway Co..... 673 Market St., San Francisco; 1218 Broadway, Oakland.

B-1 Baker-Joslyn Company..... 71 New Montgomery St., San Francisco; 911 Western Ave., Seattle; 353 E. Second St., Los Angeles.

B-2 Benjamin Electric Manufacturing Co..... 590 Howard St., San Francisco.

B-5 Bridgeport Brass Co..... 12 (See Pierson, Roeding & Co.)

B-6 Baker-Smith Company..... 4 Rialto Bldg., San Francisco.

C-1 Century Electric Co..... 4 906 So. Hope St., Los Angeles; 56 Natoma St., San Francisco; 65 Front St., Portland, Ore.

C-3 Crocker-Wheeler Co..... Crossley Bldg., 618 Mission St., San Francisco; 228 Central Avenue, Los Angeles.

C-4 Cutler-Hammer Manufacturing Co..... 579 Howard St., San Francisco; Morgan Bldg., Portland, Ore.; San Fernando Bldg., Los Angeles.

D-4 Davis Slate & Manufacturing Co..... Chicago, Ill.

D-2 Dearborn Drug and Chemical Works..... 11 355 East Second St., Los Angeles; 301 Front St., San Francisco.

E-1 Edison Lamp Works of General Electric Co..... Rialto Bldg., San Francisco; 724 So. Spring St., Los Angeles.

E-2 Edison Storage Battery Supply Co..... 11 441 Golden Gate Ave., San Francisco.

E-4 Electric Storage Battery Co..... 3 Pacific Electric Bldg., Los Angeles; Spalding Bldg., Portland; 118 New Montgomery St., San Francisco; Colman Bldg., Seattle.

E-5 Electric, Railway & Manufacturing Supply Co..... 11 34 Second St., San Francisco.

F-1 Fairbanks, Morse & Co..... Los Angeles; Portland; 651 Mission St., San Francisco; Seattle; Spokane.

F-3 Federal Sign System (Electric)..... 618 Mission St., San Francisco.

G-1 General Electric Co..... 12 724 So. Spring St., Los Angeles; Worcester Bldg., Portland; Rialto Bldg., San Francisco; Colman Bldg., Seattle; Paulsen Bldg., Spokane.

G-1 General Vehicle Co..... 1117 Van Ness Ave., San Francisco; 331 Wall St., Los Angeles; British Columbia Electric Ry., Ltd., Vancouver, B. C.

H-1 Habirshaw Wire Co..... (See Western Electric Company.)

H-2 Hemingray Glass Co..... 11 330 So. Los Angeles St., Los Angeles; 345 Oak St., Portland; 807 Mission St., San Francisco.

H-5 Hunt, Mirk & Co..... 141 Second St., San Francisco.

H-7 Hurley Machine Co..... New York and Chicago.

I-1 Indiana Rubber and Insulated Wire Co..... Fobes Supply Co., Portland and Seattle.

I-2 Illinois Electric Co..... 5 261-263 So. Los Angeles St., Los Angeles.

L-1 Leahy Manufacturing Co..... Eighth and Alameda St., Los Angeles.

L-2 Locke Insulator Manufacturing Co..... 4 (See Pierson, Roeding & Co.)

M-2 McGlauflin Manufacturing Co..... Sunnyvale, Cal. Sunnyvale, Cal.

M-4 Morse Chain Co..... 6 Monadnock Bldg., San Francisco.

M-3 Moore & Co., Charles C..... 3 Van Nuys Bldg., Los Angeles; Spalding Bldg., Portland; Kearns Bldg., Salt Lake City; Sheldon Bldg., San Francisco; Mutual Life Bldg., Seattle; Santa Rita Hotel Bldg., Tucson.

N-1 Nason & Co., R. N..... 151 Potrero Ave., San Francisco.

N-6 National Carbon Company..... Cleveland, Ohio.

N-2 National Conduit & Cable Co., The..... Trust and Savings Bldg., Los Angeles; Rialto Bldg., San Francisco.

N-3 National Lamp Works of G. E. Co..... (All Jobbers.)

N-4 New York Insulated Wire Co..... 2 629 Howard St., San Francisco.

N-5 Northwestern Pacific Railroad..... 808 Phelan Bldg., San Francisco.

O-1 Okonite Co. (The)..... 12 (All Jobbers.)

P-1 Pacific Electric Manufacturing Co..... 80 Tehama St., San Francisco.

P-2 Pacific States Electric Co..... 2 236-240 So. Los Angeles St., Los Angeles; 90 Seventh St., Portland; 200-210 Twelfth St., Oakland; 575 Mission St., San Francisco; 307 First Ave. So., Seattle.

P-4 Pelton Water Wheel Co..... 11 2219 Harrison St., San Francisco.

P-5 Pierson, Roeding & Co..... 4 Pacific Electric Bldg., Los Angeles; Rialto Bldg., San Francisco; Colman Bldg., Seattle.

P-7 Pittsburgh Piping & Equipment Co..... 12 Monadnock Bldg., San Francisco.

S-1 Schaw-Batcher Company, Pipe Works, The..... 4 211 J St., Sacramento; 356 Market St., San Francisco.

S-3 Simplex Electric Heating Co..... 12 612 Howard St., San Francisco.

S-4 Southern Pacific Co..... 12 Flood Bldg., San Francisco.

S-5 Sprague Electric Works..... 4 Rialto Bldg., San Francisco; Colman Bldg., Seattle; Corporation Bldg., Los Angeles; Electric Bldg., Portland; Paulsen Bldg., Spokane.

S-6 Standard Underground Cable Co..... 3 First National Bank Bldg., San Francisco; Hibernian Bldg., Los Angeles; Yeon Bldg., Portland; Central Bldg., Seattle, Wash.

T-1 Thomas & Co., R..... (See Western Electric Co.)

T-2 Tubular Woven Fabric Company..... Pawtucket, R I.

W-2 Western Electric Co..... 3 Eighth and Santee Sts., Los Angeles; 1901 Telegraph Ave., Oakland, Cal.; 680 Folsom St., San Francisco; 907 First Ave., Seattle; 45 North Fifth St., Portland, Ore.

W-4 Westinghouse Electric and Manufacturing Co..... 50-52 East Broadway, Butte; Van Nuys Bldg., Los Angeles; Couch Bldg., Portland; 212 So. W. Temple, Salt Lake City; 165 Second St., San Francisco; Second and Cherry Sts., Seattle; Paulsen Bldg., Spokane.

W-5 Westinghouse Machine Co..... 141 Second St., San Francisco.

W-6 Westinghouse Lamp Co..... 6 (See Westinghouse Electric & Manufacturing Co.)

W-8 Western Pipe & Steel Co..... 444 Market St., San Francisco; 1758 North Broadway, Los Angeles.